AMENDMENTS TO THE CLAIMS

This listing of claims replaces all previous listings of claims for this application.

1. (Currently amended) An apparatus for detecting a target nucleic acid sequence comprising:

a support comprising an electrode and a nucleic acid probe attached thereto, wherein the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence;

a photoelectrochemical label selective for non-covalently binding double-stranded nucleic acids over single-stranded nucleic acids ~~suitable for~~ contacting [[with]] the nucleic acid probe;

a sacrificial reductant ~~suitable for~~ contacting [[with]] the nucleic acid probe;

an electric [[a]] light source of sufficient energy and intensity to initiate a photoelectrochemical reaction of the non-covalent photoelectrochemical label for irradiating the nucleic acid probe; and

a data collection controller for measuring a current at the electrode.

2. (Previously presented) The apparatus of claim 1, wherein the nucleic acid probe comprises DNA.

3. (Previously presented) The apparatus of claim 1, wherein the nucleic acid probe comprises RNA.

4. (Previously presented) The apparatus of claim 1, wherein the target nucleic acid sequence comprises a DNA sequence.

5. (Previously presented) The apparatus of claim 1, wherein the target nucleic acid sequence comprises an RNA sequence.

6. (Previously presented) The apparatus of claim 1, wherein the support comprises an array of nucleic acid probe elements.

7. (Previously presented) The apparatus of claim 6, wherein the array comprises greater than about 10 nucleic acid probe elements.

8. (Previously presented) The apparatus of claim 1, wherein the electrode comprises at least one of gold, platinum, silicon, glassy carbon, graphite, indium-tin oxide, and diamond.

9. (Previously presented) The apparatus of claim 1, wherein the non-covalent photoelectrochemical label is a compound comprising:

a metal comprising at least one of ruthenium, osmium, cobalt, rhodium, nickel, and platinum; and

a ligand comprising at least one of polypyridyl ligands, 2,2'-bipyridine, 1,10-phenanthroline, 4,7-diphenyl-1,10-phenanthroline, dipyrido[3,2-a:2',3'-c]phenazine, 9,10-phenanthrenequinone diimine, 2,2':6',2"-terpyridine, and derivatives thereof.

10. (Previously presented) The apparatus of claim 9, wherein the non-covalent photoelectrochemical label comprises a cation is selected from the group consisting of $[Ru(bipy)3]^{2+}$, $[Ru(bipy)2dppz]^{2+}$, $[Ru(phen)3]^{2+}$, and combinations thereof.

11. (Previously presented) The apparatus of claim 1, wherein the light source is a laser.

12. (Previously presented) The apparatus of claim 1, wherein the light source radiates visible light.

13. (Canceled)

14. (Previously presented) The apparatus of claim 1, wherein the sacrificial reductant comprises at least one of a tertiary amine, tripropylamine, ethylenediaminetetraacetic acid, and salts thereof.

15. (Previously presented) The apparatus of claim 1, further comprising an optical scanner for scanning the support.

16. (Previously presented) The apparatus of claim 1, further comprising a fluid handling system for the support.

17. (Previously presented) The apparatus of claim 1, further comprising a temperature control system for the support.

18. (Previously presented) The apparatus of claim 1, wherein the support further comprises machine readable identifying indicia.

19. (Withdrawn) A method for detecting a target nucleic acid sequence comprising:

contacting a nucleic acid probe with a target nucleic acid and a photoelectrochemical label selective for non-covalently binding double-stranded nucleic acids over single-stranded nucleic acids to form a reaction mixture, wherein

the nucleic acid probe is attached to an electrode,

the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence, and

a support comprises the nucleic acid probe and the electrode;

contacting with the nucleic acid probe with a suitable sacrificial reductant;

irradiating the mixture with a light source of sufficient energy and intensity to initiate a photoelectrochemical reaction of the non-covalent photoelectrochemical label; and

observing a photocurrent at the electrode using a data collection controller, wherein the photocurrent indicates the presence and/or amount of the target nucleic acid.

20. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the nucleic acid probe comprises DNA.

21. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the nucleic acid probe comprises RNA.

22. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the target nucleic acid comprises DNA.

23. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the target nucleic acid comprises RNA.

24. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the support comprises an array of nucleic acid probe elements.

25. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the array comprises greater than about 10 nucleic acid probe elements.

26. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the electrode comprises at least one of gold, platinum, silicon, glassy carbon, graphite, indium-tin oxide, and diamond.

27. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the non-covalent photoelectrochemical label is a compound comprising:

a metal comprising at least one of ruthenium, osmium, cobalt, rhodium, nickel, and platinum; and

a ligand comprising at least one of polypyridyl ligands, 2,2'-bipyridine, 1,10-phenanthroline, 4,7-diphenyl-1,10-phenanthroline, dipyrido[3,2-a:2',3'-c]phenazine, 9,10-phenanthrenequinone diimine, 2,2':6',2"-terpyridine, and derivatives thereof.

28. (Withdrawn) The method of claim 27, wherein the non-covalent photoelectrochemical label comprises a cation is selected from the group consisting of $[Ru(bipy)3]^{2+}$, $[Ru(bipy)2dppz]^{2+}$, $[Ru(phen)3]^{2+}$, and combinations thereof.

29. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the nucleic acid probe is irradiated using a laser.

30. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the nucleic acid probe is irradiated with visible light.

31. (Canceled)

32. (Withdrawn-currently amended) The method of claim 19 [[18]], wherein the sacrificial reductant comprises at least one of a tertiary amine, tripropylamine, ethylenediaminetetraacetic acid, and salts thereof.

33. (Withdrawn) The method of claim 30, further comprising maintaining the nucleic acid probe under conditions conducive for nucleic acid hybridization.

34. (Withdrawn) The method of claim 30, further comprising washing the nucleic acid probe to remove excess nucleic acid target.

35. (Withdrawn) The method of claim 30, further comprising washing the nucleic acid probe to remove excess non-covalent photoelectrochemical label.

36–45. (Canceled)

46. (New) An apparatus for detecting a target nucleic acid sequence, the apparatus comprising:

a support comprising a nucleic acid probe attached to an electrode, wherein the nucleic acid probe comprises a sequence complementary to a target nucleic acid sequence;

a non-covalent photoelectrochemical label contacting the nucleic acid probe, wherein the photoelectrochemical label selectively binds double-stranded nucleic acids;

a sacrificial reductant contacting with the nucleic acid probe;

a light source selected from the group consisting of incandescent lamps, halogen lamps, a light emitting diodes, fluorescent lamps, arc lamps, and lasers, wherein electromagnetic radiation from the light source

is incident to at least a portion of the electrode, and

has sufficient energy and intensity to initiate a photoelectrochemical reaction of the non-covalent photoelectrochemical label; and

a data collection controller coupled to the electrode operable to measure a current at the electrode.